

CLAIMS

THAT WHICH IS CLAIMED IS:

1. A pellet comprising at least one plastomer and at least one crosslinking agent for use as an asphalt modifier.
- 5 2. A pellet according to Claim 1 wherein said crosslinking agent is present in said pellet in an amount ranging from about 0.1% by weight to about 5% by weight based on the weight of the plastomer.
3. A pellet according to Claim 1 wherein said crosslinking agent is at least one selected from elemental sulfur, hydrocarbyl polysulfides,
10 peroxides, and transition metals.
4. A modified asphalt composition comprising at least one plastomer, at least one elastomer, at least one crosslinking agent, and asphalt.
5. A modified asphalt composition according to Claim 4 wherein the amount of said elastomer and said plastomer is sufficient to increase the
15 PG rating of the modified asphalt composition by +1 to +3 grades.
6. A modified asphalt composition according to Claim 4 wherein said plastomer is present in said modified asphalt composition in an amount from about 0.1% by weight to about 10% by weight based on the weight of the modified asphalt composition.
- 20 7. A modified asphalt composition according to Claim 4 wherein said elastomer is present in said modified asphalt composition in an amount from about 0.1% by weight to about 10% by weight based on the weight of the modified asphalt composition.
8. A modified asphalt composition according to Claim 4 wherein said
25 crosslinking agent is present in said modified asphalt composition in an amount from about 0.1% by weight to about 2% by weight based on the weight of the modified asphalt composition.
9. A modified asphalt composition according to Claim 4 wherein said asphalt has a PEN value from about 40 to about 300 dmm.

10. A modified asphalt composition according to Claim 4 wherein said asphalt has an AC value from about 2.5 to about 40 hundreds of poises.

11. A modified asphalt composition according to Claim 4 wherein said asphalt has an AR value from about 1,000 to about 16,000 poises.

5 12. A modified asphalt composition according to Claim 4 wherein said plastomer is at least one homopolymer or a copolymer having at least one polar functional group and having a density from about 0.92 to about 1.1 g/cm³ at 25°C.

10 13. A modified asphalt composition according to Claim 12 wherein said plastomer is selected from oxidized polyolefins, maleated polyolefins and acrylic acid grafted polyolefins.

14. A modified asphalt composition according to Claim 13 wherein said plastomer is selected from maleated polyethylene, maleated polypropylene, oxidized polyethylene, acrylic acid grafted polyethylene, acrylic acid grafted polypropylene and mixtures and derivatives thereof.

15 15. A modified asphalt composition according to Claim 14 wherein said plastomer is oxidized polyethylene.

16. A modified asphalt composition according to Claim 4 wherein said plastomer has at least one property in the following ranges: an acid number from about 0.1 to about 50, a needle penetration hardness less than about 50 dmm at 25°C, and a viscosity from about 1 to about 100,000 cP at 135°C.

17. A modified asphalt composition according to Claim 4 wherein said plastomer is an oxidized polyethylene homopolymer having at least one of the following properties: a density from about 0.92 to about 1.1 g/cm³, a hardness less than about 1.5 dmm at 25°C, an acid number from about 5 to about 41, and a viscosity from about 800 to about 8,000 cP at 125°C.

18. A modified asphalt composition according to Claim 4 wherein said elastomer is a synthetic rubber produced from monomers obtained from the cracking and refining of petroleum.

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19. A modified asphalt composition according to Claim 18 wherein said monomers are selected from the group consisting of styrene, butadiene, carboxylated butadiene, isobutylene, isoprene, carboxylated isoprene, chloroprene, ethylene, propylene, acrylonitrile, and mixtures thereof.

5 20. A modified asphalt composition according to Claim 4 wherein said elastomer is a block copolymer of at least one conjugated diene and at least one monoalkenyl aromatic hydrocarbon.

21. A modified asphalt composition according to Claim 20 wherein said conjugated diene is at least one selected from the group consisting of
10 butadiene, isoprene, chloroprene, carboxylated butadiene, and carboxylated isoprene.

22. A modified asphalt composition according to Claim 21 wherein said conjugated diene is butadiene and isoprene.

23. A modified asphalt composition according to Claim 20 wherein said
15 monoalkenyl aromatic hydrocarbon is styrene.

24. A modified asphalt composition according to Claim 20 wherein said block copolymer has a general formula A-B-A or (A-B)_n X; wherein each A block is a monoalkenyl aromatic hydrocarbon polymer block, each B block is a conjugated diolefin polymer block, X is a coupling agent and n is an
20 integer from 2 to about 30.

25. A modified asphalt composition according to Claim 20 wherein the configuration of said block copolymer is linear, radial, star, or tapered.

26. A modified asphalt composition according to Claim 20 wherein said block copolymer has a number average molecular weight from about
25 30,000 to about 300,000.

27. A modified asphalt composition according to Claim 24 wherein said conjugated diene is butadiene and said monoalkenyl aromatic hydrocarbon is styrene and the amount of styrene repeating units in said block copolymer ranges from about 15% by weight to about 50% by weight

based on the weight of said block copolymer with the remainder being repeating units derived from butadiene.

28. A modified asphalt composition according to Claim 20 wherein said block copolymer is a styrene-butadiene block copolymers having a number
5 average molecular weight ranging from about 50,000 to about 200,000.

29. A modified asphalt composition according to Claim 5 wherein said crosslinking agent is at least one selected from elemental sulfur, hydrocarbyl polysulfides, peroxides, and transition metals.

30. A modified asphalt composition according to Claim 29 wherein
10 said polysulfide is at least one selected from the group consisting of dihexyl disulfide, dioctyl disulfide, didodecyl disulfide, di-tert-dodecyl disulfide, dihexadecyl disulfide, dihexyl trisulfide, dioctyl trisulfide, dinonyl trisulfide, di-tert-dodecyl trisulfide, dinonyl trisulfide, di-tert-dodecyl trisulfide, dihexadecyl trisulfide, dihexyl tetrasulfide, dioctyl tetrasulfide, dihexadecyl
15 tetrasulfide, dioctyl tetrasulfide, dinonyl tetrasulfide, di-tert-dodecyl tetrasulfide, dihexadecyl tetrasulfide, dihexyl pentasulfide, dioctyl pentasulfide, dinonyl pentasulfide, di-tert-dodecyl pentasulfide, dihexadecyl pentasulfide, diphenyl trisulfide, dibenzyl trisulfide, diphenyl tetrasulfide, ortho-tolyl tetrasulfide, dibenzyl tetrasulfide, dibenzyl pentasulfide, diallyl
20 pentasulfide, tetramethyltetraethane, and mixtures thereof.

31. A modified asphalt composition according to Claim 29 wherein said peroxide is selected from the group consisting of hydroperoxides, dialkyl peroxides, peroxydicarbonates, diacyl peroxides, and peroxyesters.

32. A modified asphalt composition according to Claim 29 wherein said
25 transition metal compound is at least one selected from the group consisting of zinc compounds, nickel compounds, and titanium compounds.

33. A hot mix asphalt composition comprising said modified asphalt composition of Claim 4 and aggregate.

5 34. A process for producing a modified asphalt composition comprising contacting at least one plastomer, at least one elastomer, at least one crosslinking agent and asphalt.

35. A process for producing a modified asphalt composition said process comprising:

10 1) contacting at least one plastomer, at least one elastomer, and at least one crosslinking agent to produce a pellet; and

2) adding said pellet to asphalt in a mixing zone to produce said modified asphalt composition.

15 36. A process according to Claim 35 wherein said plastomer is oxidized polyethylene and said elastomer is styrene-butadiene-styrene block copolymer.

37. A process for producing a modified asphalt composition said process comprising:

20 1) contacting at least one plastomer and at least one elastomer in an extruder zone to produce a plastomer/elastomer pellet;

2) contacting at least one plastomer and at least one crosslinking agent in an extruder zone to produce a plastomer/crosslinking agent pellet;

2) adding said plastomer/elastomer pellet and said plastomer/crosslinking agent pellet to at least one molten asphalt in a mixing zone to produce a modified asphalt composition;

25 3) mixing said modified asphalt mixture in said mixing zone to disperse the plastomer and elastomer in said plastomer/elastomer pellet to produce the modified asphalt composition.

30 38. A process according to Claim 37 wherein said plastomer/elastomer pellet and said plastomer/crosslinking agent pellet are added simultaneously to said asphalt.

39. A process according to Claim 38 wherein said plastomer is oxidized polyethylene and said elastomer is styrene-butadiene-styrene block copolymer.

5 40. A process for producing a hot mix asphalt composition comprising contacting at least one plastomer, at least one elastomer, at least one crosslinking agent, asphalt, and aggregate.

41. A process for producing a hot mix asphalt composition said process comprising:

- 10 1) contacting at least one plastomer and at least one elastomer in an extruder zone to produce a plastomer/elastomer pellet;
- 2) contacting at least one plastomer and at least one crosslinking agent in an extruder zone to produce a plastomer/crosslinking agent pellet;
- 3) adding said plastomer/elastomer pellet and said plastomer/crosslinking agent pellet to at least one molten asphalt in a
- 15 mixing zone to produce a modified asphalt mixture;
- 4) mixing said modified asphalt mixture in said mixing zone to disperse the plastomer, elastomer, and crosslinking agent to produce said modified asphalt composition; and
- 5) contacting said modified asphalt composition with aggregate to
- 20 produce said hot mix asphalt composition.

42. An article produced by the modified asphalt composition of Claim 4.

43. An article produced by the hot mix asphalt composition of Claim 33.